

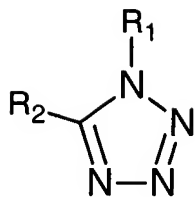
Remarks

The present application includes claims 1-12 and 21. Claims 1-3, 12 and 21 stand rejected as anticipated by or, in the alternative, as obvious over Bayes et al (6,054,061). Claims 4-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bayes in view of Adlam et al (5,861,076). Claim 9 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bayes in view of Adlam and further in view of Noddin (5,910,255). Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bayes in view of Bishop et al (6,284,309). Claim 10 is listed as rejected in the Office Action Summary, but the Office Action provides no explanation for why claim 10 stands rejected.

By this Amendment, claim 1 has been amended and new claim 22 has been added. Support for the amendments and new claim appears in the specification on page 8, lines 11-16; page 10, line 19 through page 11, line 8; and Figures 1 and 3. The applicants respectfully submit that pending claims 1-12 and 21-22 are patentable for the reasons provided below.

35 U.S.C. § 102 (Anticipation) – Bayes et al. (6,054,061)

Applicants first turn to the rejection of claims 1-3, 12 and 21 under 35 U.S.C. 102(e) as being anticipated by Bayes. Claim 1 recites a process for preparing a roughened copper surface which involves the step of contacting a copper surface with an adhesion promoting composition. As amended, the adhesion promoting composition of claim 1 contains hydrogen peroxide, a pH adjuster (an acid), a 5-membered aromatic fused N-heterocyclic ring compound where the N-heterocyclic ring has a nitrogen atom at position 1 bonded to a hydrogen atom, and a uniformity enhancer having the formula:



Formula (I)

wherein R1 and R2 are independently selected from hydrogen or hydroxyl, amino, alkyl, hydroxyalkyl, aminoalkyl, nitroalkyl, mercaptoalkyl, or alkoxy groups.

Applicants submit that Bayes does not contain each and every element of amended claim 1. The composition of Bayes contains an oxidizer, an acid, an amine or quaternary ammonium compound, and an optional “corrosion inhibitor.” The specification of Bayes states that:

The corrosion inhibitor, when used, is typically selected from one or more of a triazole, tetrazole or imidazole. Unsubstituted and substituted triazoles and benzotriazoles are preferred.

Col. 5, lines 32-36. Bayes does not teach an adhesion promoting composition that contains Applicants’ unique combination of a specific 5-membered aromatic fused N-heterocyclic ring compound and a uniformity enhancer according to formula (I) above. Bayes simply does not show “[t]he identical invention . . . in as complete detail as is contained in the . . . claim.” MPEP § 2131 (quoting *Richardson v. Suzuki Motor Co.*). Applicants respectfully submit that claim 1, as amended, is not anticipated by Bayes.

Applicants also submit that Bayes does not anticipate dependent claim 10, which was not addressed by the October 24, 2005 Office Action. Claim 10 recites that the uniformity enhancer of claim 1 is 5-aminotetrazole. Nowhere does Bayes disclose or name the compound 5-aminotetrazole. For the same reason, Applicants submit that Bayes does not anticipate new claim 22. New claim 22 recites a number of specific uniformity enhancers, none of which are disclosed or named in Bayes.

For the reasons given above, Applicants respectfully submit that none of claims 1, 10 or 22 (or claims 2-3, 12 and 21 which depend either directly or indirectly from claim 1) are anticipated by Bayes.

35 U.S.C. § 103 (Non-obviousness) – Bayes et al. (6,054,061)

Claims 1-3, 12 and 21 also stand rejected under 35 U.S.C. § 103(a) as obvious over Bayes. Applicants submit that a skilled artisan would not find it obvious from the teachings of Bayes to arrive at an adhesion promoting composition that contains Applicants' unique combination of a specific 5-membered aromatic fused N-heterocyclic ring compound and a uniformity enhancer according to formula (I). Nor would a skilled artisan find it obvious from Bayes to arrive at the above combination where the uniformity enhancer according to formula (I) is selected from among the list of compounds in new claim 22. Nor would a skilled artisan find it obvious from Bayes to arrive at the above combination where the uniformity enhancer according to formula (I) is 5-aminotetrazole as recited in claim 10. There is nothing in the specification of Bayes to suggest that any of these combinations would have any particular benefit. None of the 114 examples in Bayes make use of these combinations. In fact, no compound falling with formula (I) appears in any example of Bayes. The focus of Bayes is instead on variations in the amine component and the inorganic acid component.

Applicants, on the other hand, discovered that there is an unexpected benefit to adding a compound falling within formula (I)—a tetrazole—to an adhesion promoting composition which contains hydrogen peroxide, a pH adjuster and benzotriazole. In particular, the use of a tetrazole falling within formula (I) leads to a more uniformly etched copper surface. In order to overcome a previous rejection based on the Ferrier

(6,162,503) patent, Applicants submitted a declaration of Applicant Roger Bernards which describes the unexpected and unique nature of this discovery. Applicants have resubmitted, simultaneously with this Amendment, Mr. Bernards' declaration as evidence of the nonobviousness of claims 1-3, 12 and 21 over Bayes. (See enclosed copy of Declaration Under Rule 132 dated September 9, 2003.) Mr. Bernards' declaration also demonstrates the nonobviousness of claims 10 and 22, both of which depend from claim 1.

As Mr. Bernards explains in his declaration, he conducted several experiments comparing an adhesion promoting composition that contained a tetrazole with an adhesion promoting composition that did not contain a tetrazole. Bernards Dec. ¶ 4. These experiments are described as Examples 1-3 in the patent application. Bernards Dec. ¶ 4. In Examples 1 and 2, Mr. Bernards used an adhesion promoting composition that contained hydrogen peroxide, a pH adjuster (sulfuric acid), and a 5-membered aromatic fused N-heterocyclic ring compound where the N-heterocyclic ring has a nitrogen atom at position 1 bonded to a hydrogen atom (benzotriazole), but which did not contain a tetrazole. Bernards Dec. ¶¶ 5-6, 8; specification, page 19.

When applied to a copper surface, the composition of Example 1 both etched and modified the surface. However, the etched surface was undesirably speckled with shiny spots of copper, indicating a non-uniform etch. Bernards Dec. ¶ 7. Similarly, the composition of Example 2 both etched and modified the copper surface, but the etched surface developed undesirable striations that were indicative of a non-uniform etch. Bernards Dec. ¶ 8.

Mr. Bernards used a tetrazole falling within formula (I) in Example 3. In particular, he applied the following composition to a copper surface: 3% hydrogen peroxide, 5% sulfuric acid, 1.5 g/l benzotriazole, 0.5 g/l **5-Aminotetrazole**, and the balance deionized water. This tetrazole-containing adhesion promoting composition both etched and modified the copper surface. Unlike Examples 1 and 2 however, the etched surface was desirably uniformly etched. Bernards Dec. ¶ 9. These same results are provided in the specification of the application. See page 17, Examples 1-3 and Table 1 on page 19.

Mr. Bernards was surprised by this result. Bernards Dec. ¶ 10. He did not expect that the addition of a tetrazole would lead to a uniformly etched surface. Bernards Dec. ¶ 10. In fact, at the time Mr. Bernards and his co-inventors filed the application, tetrazoles were not known in the art as compounds which can improve the uniformity of a controlled etch. Bernards Dec. ¶ 10. As a result of their discovery, applicants called the tetrazole component of their adhesion promoting composition a “uniformity enhancer.” Bernards Dec. ¶ 10.

Thus, Mr. Bernards discovered during the course of his experimentation that the particular combination of an oxidizer (hydrogen peroxide), a pH adjuster, a 5-membered aromatic fused N-heterocyclic ring compound where the N-heterocyclic ring has a nitrogen atom at position 1 bonded to a hydrogen atom, and a uniformity enhancer falling within formula (I) (the tetrazole) leads to the unexpected and beneficial result of a uniformly etched surface. Bernards Dec. ¶ 11. Nothing in Bayes would lead a person of ordinary skill in the art to expect this particular benefit if he or she were to combine a benzotriazole or a benzimidazole with a tetrazole as the “corrosion inhibitor” for that

reference. For this reason, applicants submit that it would not be obvious from the teaching of Bayes to make the particular combination of compounds that would result in the applicants' claimed subject matter.

A showing of unexpected results supports the nonobviousness of a claimed invention. Thus, applicants submit that rejected claims 1-3, 10, 12 and 21-22 are not obvious, and respectfully request that the Examiner acknowledge their allowability.

Remaining Obviousness Rejections

The remaining obviousness rejections in the October 24, 2005 Office Action pertain to claims 4-8, 9 and 11, all of which depend, either directly or indirectly, from claim 1. Because claim 1, as amended, has been shown above to be patentable, Applicants submit that claims 4-8, 9 and 11 are patentable as dependent on an allowable base claim. Nonetheless, Applicants continue to traverse these obviousness rejections for at least the following reasons (which have been articulated in prior submissions):

1. A skilled artisan would not find it obvious to combine the teachings of Bayes with Adlam to arrive at the post-dip step that is recited in applicants' claims. Adlam pertains to a more traditional black oxide coating process, whereas Bayes pertains to an alternative oxide process in which the copper surface is both etched and modified.

2. A skilled artisan would not find it obvious to combine the teachings of Bayes with Bishop to arrive at the supplemental use of a copper salt that is recited in applicants' claim 11. Bishop makes use of a copper complex to ostensibly promote adhesion. However, the copper complex of Bishop is always used in conjunction with a "copper complexing agent." See Col. 4, lines 2-3. By inference, the copper complex and the copper complexing agent of Bishop work in conjunction to achieve the desired

adhesion characteristics, which apparently involves precipitating copper from the solution onto the copper surface. Bayes, by way of distinction, does not disclose the use of a copper complexing agent, and it is submitted that the composition of Bayes primarily etches, or **removes**, copper from the surface rather than precipitating additional copper onto the surface.

Conclusion

The applicant has shown that this application satisfies all the legal requirements pointed out by the Examiner. Therefore, the Examiner is respectfully requested to prepare a Notice of Allowability allowing all the pending claims 1-12 and 21-22.

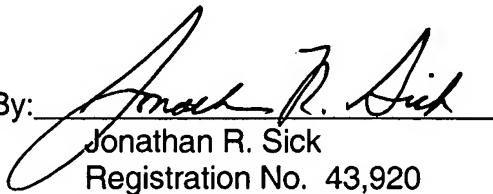
If the Examiner has any questions or the Applicants can be of any assistance, the Examiner is invited and encouraged to contact the Applicants at the number below.

The Commissioner is authorized to charge any necessary fees or credit any overpayment to the Deposit Account of McAndrews, Held & Malloy, Account No. 13-0017.

Respectfully submitted,

McANDREWS, HELD & MALLOY, LTD.

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